Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Weyl Semimetal in a Topological Insulator Multilayer
ANTON BURKOV, University of Waterloo, LEON BALENTS, Kavli Institute for Theoretical Physics, UCSB — We propose a simple realization of the three-dimensional (3D) Weyl semimetal phase, utilizing a multilayer structure, composed of identical thin films of a magnetically-doped 3D topological insulator (TI), separated by ordinary-insulator spacer layers. We show that the phase diagram of this system contains a Weyl semimetal phase of the simplest possible kind, with only two Dirac nodes of opposite chirality, separated in momentum space, in its bandstructure. This Weyl semimetal has a finite anomalous Hall conductivity, chiral edge states, and occurs as an intermediate phase between an ordinary insulator and a 3D quantum anomalous Hall insulator. We discuss unusual transport properties of the Weyl semimetal, and in particular point out quantum critical-like scaling of the DC and optical conductivity.

Anton Burkov
University of Waterloo

Date submitted: 10 Nov 2011 Electronic form version 1.4